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MASS STORAGE MODULE
MSM-2000
USER'S MANUAL

208817 Rev A

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Photo of the FORCE Mass Storage Module (MSM)



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1.0 General Information

The Force Mass Storage Module (MSM) is a high quality, highly reliable, VMEbus form factor module that provides up to 2 Gigabytes of 3.5" SCSI Hard Disk drive and a 2 MB (unformatted) Slim line 3.5" Floppy Drive in a two slot package. The MSM is cable compatible with Force SPARC Single Board Computers.

The MSM combines popular 3.5" products into a package that can be put into a VMEbus backplane and be connected to various Force single board computers with a single 64 pin flat cable. Other SCSI and SA460 disk controllers can be used by using the IOPI backpanel and cabling.

All P2 connections are passed through the MSM to allow multiple MSMs to be cascaded for additional capacity and flexibility. In addition, both P1 connectors pass the four Bus Grant signals and the daisy chain IACK signal. In case one needs to use the serial or parallel signals, or to interface to another floppy or SCSI interface device an IOPI can be inserted into the second P2 and then a standard SCSI and floppy interface cables can be used.

The mechanical assembly is adjustable to insure proper spacing and compliance to the VMEbus form factor. Power is drawn from the +5V and +12V pins on the VME P1 connectors.

CAUTION: Please allow 25 Seconds MINIMUM spin down before removal.

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2.0 Specifications

2.1 General MSM Specifications

Table 1: General Specifications

MSM Model Number	MSM 2000
Mechanical Info	Double Eurocard 2 Slot
Dimensions (in) HxDxW	10.31 x 7.43 x 1.59
Total Power Consumption	<30 WATTS
DC Requirements	Both P1s Must have all grounds supplied.
+5.0V	<1.44
+12.0V TYP/MAX	.57A/1.9A

2.2 Floppy Disk Specifications

Table 2: Floppy Disk Specifications

Manufacture	Sony or Similar
Series Number	MPF920-1
Floppy Disk Capacity	2.0 MB
Disk Size	3.5"
Number of Tracks	160
Rotational Speed(RPM)	300
Data Transfer Rate (Kb/s)	500
Access Time Average (ms)	94
MTBF (power on hour)	30,000
Track Density	135 TPI
DC Requirements (stand-by)	17 mW max.
+5.0V ± 10%	3 mA max. (stand by)

2.3 Hard Disk Specifications

Table 3: Hard Disk Specifications

Manufacture	Seagate or Similar
Series/Model Number	ST32272N
Hard Disk Capacity	2 GB
Disk Size	3.5"
Sector Size (Bytes)	512/(factory)
MTBF (power on hours)	1,000,000
Cache Size (Bytes)	512K
Number of Cylinders	26,311
Number of Disk	2
Number of Heads	4
Number of Bytes/Track	124,000 (Average, unformatted)
Number of Blocks/Track (512K)	varies
Average Seek Time (ms)	9.4 (Read), 10.4 (Write)
Track Density (TPI)	6,800
+5.0V ± 5%	.81A
+12.0V Typ/Max ± 10%	.85A

See the hard disk manual within this document for more information.

3.0 Installation Instructions

3.1 Installation Considerations

There are two methods of installing the Force MSM. The most common method is to use the supplied 64 Pin flat cable that is designed to connect P2 of the Force SPARC single board computers to P2 of the MSM- 1000. Just plug the MSM into two P1 VME slots and connect the 64 Pin flat cable to the P2 connector of the leftmost P2 on the MSM. Insure that there is sufficient clearance on both sides of the MSM and any other installed devices.

The second method of installing and cabling the MSM is to install an IOPI adapter in the lowest numbered P2 connector in place of the supplied 64 pin flat cable. This IOPI allows industry standard cabling to be used to connect to the MSM.

3.2 Floppy Drive Configuration

The Floppy Disk Drive is jumpered to respond to drive select 0 (DS0*). The DS0* input comes from the MSM backpanel jumperfield J5 and the actual drive select number is determined by which jumper is inserted in J5; DS3, DS2, DS1 or DS0. Only one of these jumpers can be inserted. The default is DS0.

See the device data sheet in section 3.3 of the Sony Product Specification included in this manual.

Refer to section 3.5.2 and figure 3.3 of the Sony Product Specification for information on the drive select jumper location and the factory defaults.

3.2.1 MTR_ON Jumper field

Normally the FDD is configured to start the motor when the MTR_ON signal is asserted. For those boards/drivers that do not drive the MTR_ON signal, the MSM can be jumpered to start the motor on the Drive Select that is configured on jumperfield J5.

To start the FDD motor with the Drive Select signal, insert a jumper into J6 in the DS position. To select the FDD motor on the Motor-on signal, insert a jumper into J6 in the MTR position. (This is the default position). It is recommended that only one jumper be left in J6 because back circuits can be created which could cause multiple selects.

3.2.2 Hard Disk Configuration

The SCSI Hard Disk Drive can be jumpered for different unit addresses according to the SCSI Target ID's. See Hard Disk Drive manual for jumper information. The SCSI bus Hard Disk drive can be configured to respond to unit addresses 0-7. Factory default for Solaris is 3.

3.3 SCSI Bus Termination

Each SCSI BUS signal is terminated at the physical start and the physical end of the SCSI bus. Therefore, the terminators are removed from the SCSI device to insure that there are no terminators except at each physical extreme of the bus. A 50 pin terminator is supplied in a bag to terminated the end of the SCSI bus. Power for the SCSI bus terminators is expected on pin 26 of the SCSI cable and is jumper selectable on the drive.

3.4 Disk Formatting

The MSM comes standard with a preformatted hard disk for Solaris. See your operating system manuals for instructions if your drive ever needs reformatting.

3.5 Cabling Diagrams

Figure 3-1: Cabling Diagram Method 1 (CPU to MSM direct)

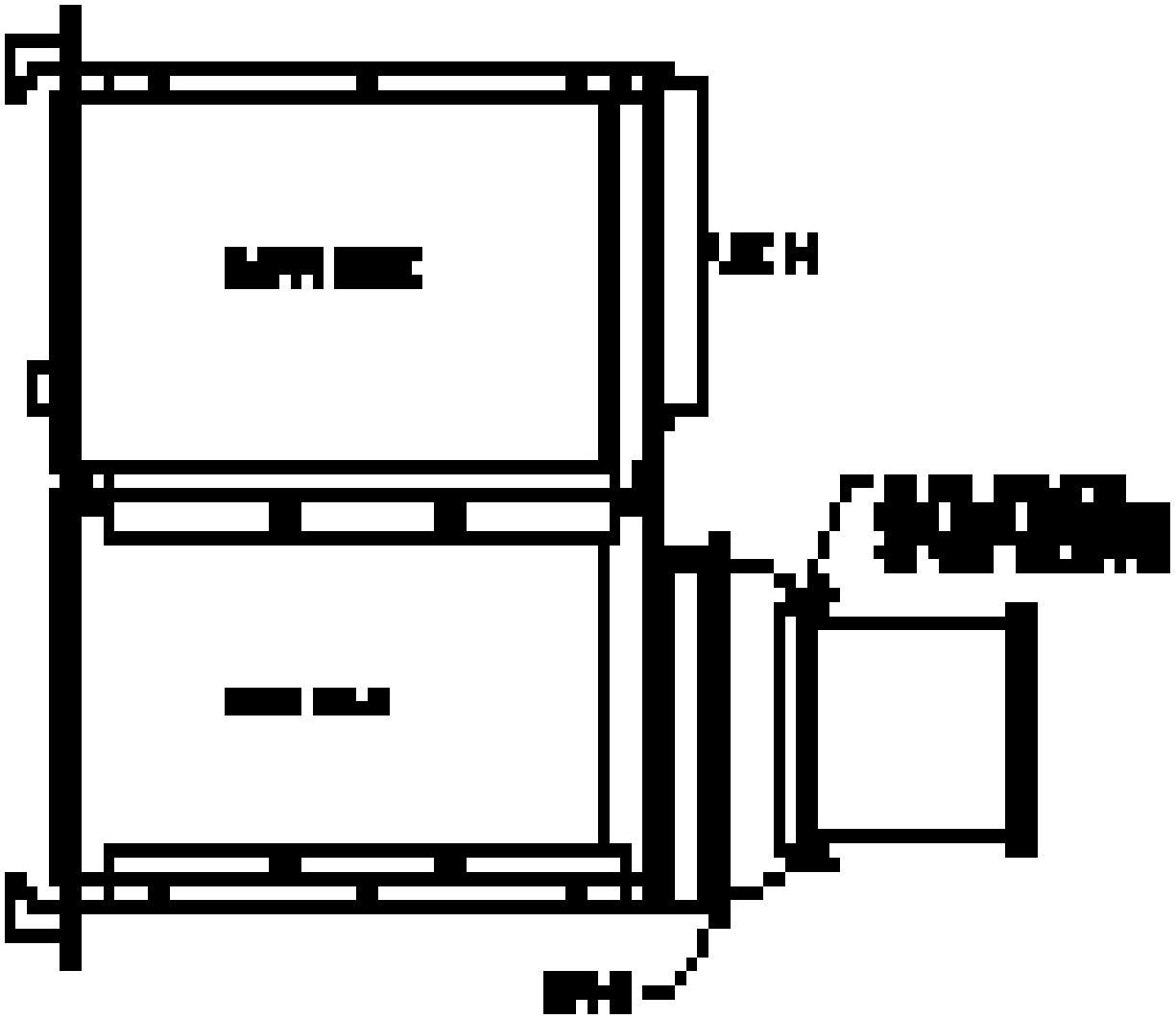
Cabling CPU to MSM Direct

Rear View of the Chassis/Backplane

Figure 3-2: Cabling Diagram Method 2

Cabling Diagram

Side View of the MSM Installed in Chassis



4.0 Hardware User’s Manual

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4.1 P1 Pin Definitions (Both P1 Connectors Identical)

The following pins are installed and connected on each P1 connector on the MSM:

Ground - A09,A11,A15,A17,A19,B20,B23,C09 (Connected to GND Plane)

+5V - A32, B32, C32 (Connected to +5V Plane)

+12V - C31 (Connected to +12V Plane)

IACKIN* to IACKOUT* - A21 to A22

BG0IN* to BG0OUT* - B04 to B05

BG1IN* to BG1OUT* - B06 to B07

BG2IN* to BG2OUT* - B08 to B09

BG3IN* to BG3OUT* - B10 to B11

See schematics for further information.

4.2 P2 Pin Definitions (Both P2 Connectors Identical)

Table 4: P2 Pin Definitions

Pin No.	SIGNAL ROW A	Pin No.	SIGNAL ROW C
1	DATA BUS 0	1	FDD Pin 2 (N/C)
2	DATA BUS 1	2	FDD Pin 4 (N/C)
3	DATA BUS 2	3	FDD Pin 6 (N/C)
4	DATA BUS 3	4	Index-
5	DATA BUS 4	5	Drive Select 0
6	DATA BUS 5	6	Drive Select 1
7	DATA BUS 6	7	FDD Pin 14 (N/C)
8	DATA BUS 7	8	Motor On-
9	DATA BUS P	9	Direction Select-
10	GROUND*	10	Step-
11	GROUND*	11	Write Data-
12	GROUND*	12	Write Gate-
13	TERMPOWER	13	Track 00-
14	GROUND*	14	Write Protected-
15	GROUND*	15	Read Data-
16	ATTENTION	16	Side 1 Select-
17	GROUND*	17	Ready/Disk Change-
18	BUSY	18	N/U Passed Thru
19	ACKNOWLEDGE	19	N/U Passed Thru
20	RESET	20	N/U Passed Thru
21	MESSAGE	21	N/U Passed Thru
22	SELECT	22	N/U Passed Thru
23	CONTROL/DATA	23	N/U Passed Thru
24	REQUEST	24	N/U Passed Thru
25	INPUT/OUTPUT	25	N/U Passed Thru
26	N/U Passed Thru	26	N/U Passed Thru
27	N/U Passed Thru	27	N/U Passed Thru

Table 4: P2 Pin Definitions

Pin No.	SIGNAL ROW A	Pin No.	SIGNAL ROW C
28	N/U Passed Thru	28	N/U Passed Thru
29	N/U Passed Thru	29	N/U Passed Thru
30	N/U Passed Thru	30	N/U Passed Thru
31	N/U Passed Thru	31	N/U Passed Thru
32	N/U Passed Thru	32	N/U Passed Thru

"N/U Passed Thru" indicates the signal is not used on the MSM but is just passed from one P2 connector to the other.

GROUND* These Signals are defined as Ground by the SCSI Specification.

4.3 Floppy Disk Interface Signals

The Floppy Disk Interface is a standard SA 460 interface to accommodate industry standard 3.5" slim line disk drives. The signals are defined as follows:

Table 5: Floppy Disk Interface Signals

Pin No.	Signal Name	Pin No.	Signal Name
1	NC	2	Not Connected
3	NC	4	Not Connected
5	NC	6	Not Connected
7	Ground	8	Index-
9	Ground	10	Drive Select 0-
11	Ground	12	Drive Select 1
13	Ground	14	Not Connected
15	Ground	16	Motor On-
17	Ground	18	Direction Select-
19	Ground	20	Step-
21	Ground	22	Write Data-
23	Ground	24	Write Gate-
25	Ground	26	Track 00-
27	Ground	28	Write Protected-
29	Ground	30	Read Data-
31	Ground	32	Side 1 Select-
33	Ground	34	*Ready/Disk Change

*Pin 34 can be configured on the drive.

See drive Data Sheet for information.

SIGNAL DEFINITIONS:

RESERVED - For future expansion.

INDEX -There is a pulse on this signal to indicate that a hole has been detected in the media. There is one hole that is used to signal the beginning of a track.

DRIVE SELECT 0-1 There are two drive select signals to select the drive. The MSM jumper (J5) allows the FDD to respond to one of these drive selects.

MOTOR ON -The spindle motor runs when this signal is active. Some drives may require a delay after motor on before reads or writes may be attempted.

DIRECTION SELECT- This signal is used to indicate which direction to move the floppy drive heads when the step signal is issued. When active (-), the heads are moved toward the higher numbered tracks.

STEP - A one microsecond pulse to the floppy drive causes the read/write heads to move one track. The direction depends upon the direction select signal above.

WRITE DATA -A pulse on this signal causes the floppy disk drive to write a data bit on the media if the write gate is active.

WRITE GATE -An active level on this pin signals the floppy disk drive to allow writing on the media if the write data signal is pulsed. Insure that all start-up, head settle times and head load times have been complied with before issuing this signal.

TRACK 00 -This signal from the floppy disk drive indicates that the heads are positioned at track 00.

WRITE PROTECTED-This signal when low or negative indicates that the media in the drive presently has the write enable/disable slide in the disable position.

READ DATA -The floppy disk drive will send a pulse on this line when a bit is detected on the media.

SIDE 1 SELECT -This is a signal to the floppy disk drive to select the upper head/head one.

READY/DISK CHANGE- This signal is configurable on the floppy disk drive. When configured for READY, it indicates that the drive contains the proper media. When configured for DC, it indicates if the media has been changed since the last time a step pulse has been issued.

DISK CHANGE -This signal comes from the floppy to the controller to indicate whether or not a diskette has been changed since the last step pulse issued.

4.4 Hard Disk Interface Signals

There are a total of eighteen signals. Nine are used for control, and nine for data. The data bus includes parity.

Table 6: Hard Disk Interface Signals

Pin No.	Signal Name	Pin No.	Signal Name
1	Ground	2	DATA BUS 0 (DB0)
3	Ground	4	DATA BUS 1
5	Ground	6	DATA BUS 2
7	Ground	8	DATA BUS 3
9	Ground	10	DATA BUS 4
11	Ground	12	DATA BUS 5
13	Ground	14	DATA BUS 6
15	Ground	16	DATA BUS 7 (DB7)
17	Ground	18	DATA BUS P (DBP)
19	Ground	20	GROUND
21	Ground	22	GROUND
23	Ground	24	GROUND
25	Ground	26	TERMPOWER
27	Ground	28	GROUND
29	Ground	30	GROUND
31	Ground	32	ATTENTION
33	Ground	34	GROUND
35	Ground	36	BUSY
37	Ground	38	ACKNOWLEDGE
39	Ground	40	RESET
41	Ground	42	MESSAGE
43	Ground	44	SELECT
45	Ground	46	CONTROL/DATA
47	Ground	48	REQUEST
49	Ground	50	INPUT/OUTPUT

SIGNAL DEFINITIONS

BUSY -An "OR-tied" signal that indicates the bus is being used.

SELECT -A signal used by an initiator to select a target or by a target to reselect an initiator.

CONTROL/DATA A signal driven by a target that indicates whether CONTROL or DATA information is on the data bus. True indicates CONTROL.

INPUT/OUTPUT A signal driven by a target that controls the direction of data movement on the data bus with respect to the initiator. True indicates input to the initiator. This signal is also used to distinguish between SELECTION and RESELECTION process.

MESSAGE - A signal driven by a target during the MSG phase.

REQUEST -A signal driven by a target to indicate a request for a REQ/ACK data transfer handshake.

ACKNOWLEDGE -A signal driven by an initiator to indicate an acknowledgment for REQ/ACK data transfer handshake.

ATTENTION -A signal driven by an initiator to indicate an ATTENTION condition.

RESET - An "OR-tied" signal that indicates the RESET condition.

DATA BUS 0-7,P Eight Data bits and a Parity bit which together form a data bus. DB7 is the most significant bit, and has the highest priority during the ARBITRATION phase. Bit number, significance, and priority decrease as the bit number decreases. A data bit is defined as one when the signal value is true and a zero when the signal is false.

Data parity DB(P) is odd. The use of parity is a system option (i.e., a system configured so that all SCSI devices on a bus generate parity and have parity detection enabled, or all SCSI devices have parity detection disabled or not implemented.) Parity is not valid during the ARBITRATION phase.

4.5 SCSI Bus Termination

Each SCSI BUS signal is terminated at the physical start and the physical end of the SCSI bus. Therefore, the terminators must be removable from any SCSI devices to insure that there are no terminators except at each physical extreme of the bus. See section 3.3

4.6 Schematics

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5.0 Copies of Device Data Sheets

Abbreviated SONY MPF920-1 (or similar)

Abbreviated SEAGATE ST32272N Hard Disk Drives Product Manual (or similar)

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6.0 Customer Product Error Report

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